

WHAT IS CLAIMED IS:

1. A method for marking a polymeric surface, the method comprising:
directing a first laser beam to form a lightened area on a
5 surface; and
directing a second laser beam upon the lightened area to form a first mark darker than the lightened area.
2. The method of Claim 1 including burning a portion of the lightened area with the second laser beam to form the first mark.
- 10 3. The method of Claim 1 including removing a portion of the lightened area with the second laser beam to expose raw polymeric material to form the first mark.
4. The method of Claim 1, wherein the first laser beam has a first energy density and wherein the second laser beam has a second greater
15 energy density.
5. The method of Claim 1, wherein the first laser beam is moved across the surface at a first speed and wherein the second laser beam is moved across the lightened area at a second slower speed.
6. The method of Claim 1, wherein the surface is moved relative to
20 the first laser beam at a first speed and wherein the lightened area is moved relative to the second laser beam at a second slower speed.
7. The method of Claim 1, wherein the first laser beam has a first duty cycle and wherein the second laser beam has a second greater duty cycle.

8. The method of Claim 1 including directing the second laser beam upon the lightened area to form a second mark darker than the lightened area and spaced from the first mark.

9. The method of Claim 8, wherein the first mark and the second
5 mark are configured to be read by an optical scanning device.

10. The method of Claim 8, wherein the first mark and the second mark are configured to be part of an identification matrix.

11. The method of Claim 1, wherein the first mark is configured to be read by an optical scanning device.

10 12. The method of Claim 1, wherein the first laser beam is configured to vaporize at least one additive along the surface.

13. The method of Claim 1, wherein the at least one material includes carbon black.

14. The method of Claim 1, wherein the surface is a polymeric
15 material including carbon black.

15. The method of Claim 1, wherein the first mark is contained within a total mark area and wherein the lightened area extends at least six pixels beyond the total mark area.

16. The method of Claim 1, wherein the first laser beam is produced
20 by a Q-switched Nd:YAG laser having a 1064 nanometer wavelength.

17. The method of Claim 16, wherein the laser beam has a duty cycle of between about 10 kilohertz and about 100 kilohertz, a power of between about 1 watt and 50 watts and a scan speed of between about 100 millimeters per second and about 4,000 millimeters per second.

25 18. The method of Claim 16, wherein the first laser beam has a first frequency of 60 kilohertz, a first power of 4.38 watts and a first scan speed of

1,500 millimeters per second and wherein the second laser beam has a second frequency of 60 kilohertz, a second power of 4.38 watts and a second scan speed of about 350 millimeters per second.

19. The method of Claim 1, wherein the first laser beam has a
5 wavelength of between about 1,000 nanometers and about 1,500 nanometers.

20. The method of Claim 1, wherein the first laser beam is produced by a carbon dioxide laser having a wavelength of between about 9.2 micrometers and about 10.6 micrometers.

10 21. The method of Claim 1, wherein the first laser beam and the second laser beam is generated by a common laser.

22. The method of Claim 21, wherein the first laser beam has a first power and wherein the second laser beam has a second greater power.

23. A method for identifying parts having a polymeric surface, the
15 method comprising:

directing a first laser beam on the surface to form a lightened area on the surface;

directing a second laser beam upon the lightened area to form a first mark darker than the lightened area;

20 moving at least one of the part and an optical scanner relative to one another, wherein the scanner produces signals based upon the first mark; and

identifying the part based at least partially upon the signals produced by the optical scanner.

24. A method for identifying a part having a polymeric surface, the
25 method comprising:

scanning a first mark formed on the polymeric surface by a first laser beam and a surrounding lightened area formed on the surface with a second laser beam.

5 25. An article marking system comprising:
 a laser; and
 a controller configured to generate control signals, wherein the laser is configured to form a lightened area upon a surface of an article and is also configured to form a darker mark over the lightened area in response to the control signals.

10 26. The system of Claim 25, wherein the laser is configured to direct a first laser beam on the surface to form the lightened area and a second laser beam upon the lightened area to form the darker mark.

15 27. The system of Claim 26, wherein the first laser beam has a first energy density and wherein the second laser beam has a second greater energy density.

28. The system of Claim 26 including an actuator configured to move the first laser beam across the surface at a first speed and the second laser beam across the lighted area at a second slower speed in response to control signals from the controller.

20 29. The system of Claim 26 including an actuator configured to move the surface relative to the first laser beam at a first speed and a lightened area relative to the second laser beam at a second slower speed in response to control signals from the controller.

25 30. The system of Claim 26, wherein the laser is configured to generate the first laser beam having a first duty cycle and the second laser beam having a second greater duty cycle in response to the control signals.

31. The system of Claim 26, wherein the laser is configured to form a second darker mark over the lighted area that is spaced from the first mark.

32. The system of Claim 31, wherein the controller is configured to generate the control signals such that the first mark and the second mark are
5 readable by an optical scanning device.

33. The system of Claim 31, wherein the controller is configured to generate the control signals such that the first mark and the second mark are part of an identification matrix.

34. The system of Claim 25, wherein the laser is configured to
10 vaporize at least one additive along the surface of the article in response to the control signals.

35. The system of Claim 25, wherein the laser is an Nd:YAG laser configured to produce a laser beam having a 1,064 nanometer wavelength.

36. The system of Claim 25, wherein the laser is configured to
15 generate a laser beam having a wavelength of between about 1,000 nanometers and about 1,500 nanometers in response to the control signals.

37. The system of Claim 25, wherein the laser comprises a carbon dioxide laser and is configured to produce a laser beam having a wavelength of between about 9.2 micrometers and about 10.6 micrometers in response to
20 the control signals.

38. A processor readable medium configured to be read by a / processor to cause the processor to generate control signals causing a laser to direct a first laser beam on a surface of an article to form a lightened area on the surface and to direct a second laser beam upon the lightened area to
25 form a mark darker than the lightened area.

39. A laser marked article comprising:
a polymeric surface;

a laser-induced lightened area upon the surface; and
a laser mark over the lightened area.

40. The article of Claim 39, wherein the laser mark is configured to identify the article.

5 41. The article of Claim 39, wherein the laser mark is configured to be read by an optical scanner.

42. The article of Claim 39, wherein the laser mark is configured to be read by a handheld scanner.

10 43. The article of Claim 39, wherein the article includes a plurality of laser burnt marks over the lightened area including the laser mark, wherein the plurality of laser marks are configured to represent a character string.

44. The article of Claim 39, wherein the polymeric surface is noryl.

45. The article of Claim 39, wherein the laser mark is configured to be read by an optical scanner having a focus of ± 600 micrometers.

15 46. The article of Claim 39, wherein the article is configured as part of a print cartridge body.

20 47. The article of Claim 39, wherein the article includes a plurality of laser marks over the lightened area including the laser mark, wherein the plurality of laser marks occupy a total mark area and wherein the lightened area extends at least six pixels beyond the total mark area.